

Interagency Education Research Initiative -- (FY2002) (IERI)

Program Solicitation

NSF-02-062

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES
DIVISION OF RESEARCH, EVALUATION AND COMMUNICATION

LETTER OF INTENT DUE DATE(S) (*optional*): March 15, 2002

FULL PROPOSAL DEADLINE(S): May 15, 2002



NATIONAL SCIENCE FOUNDATION



DEPARTMENT OF EDUCATION



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SUMMARY OF PROGRAM REQUIREMENTS

GENERAL INFORMATION

Program Title: Interagency Education Research Initiative -- (FY2002) (IERI)

Synopsis of Program:

The goal of the Interagency Education Research Initiative (IERI) is to increase knowledge of "scaling up" by supporting research that investigates the effectiveness of educational interventions in reading, mathematics, and the sciences as they are implemented in varied school settings with diverse student populations. The ultimate aim of IERI is to identify the conditions under which effective evidence-based interventions to improve preK-12 student learning and achievement in reading, mathematics, and the sciences succeed when applied on a large scale. It is the focus on scaling up as a topic of investigation that gives IERI its distinct identity as a federally sponsored program of research. The study of scaling up requires investigators to integrate an understanding of the learning outcomes related to specific educational interventions with a rigorous analysis of the logistical, organizational, political, and economic factors that facilitate or impede the implementation of the interventions in varied school settings.

Interventions proposed for scaling up should have already established evidence of effectiveness. Research on scaling up also requires that collaborative arrangements with significant numbers of schools, school districts, and or states support the intent to execute and study the wide-scale implementation of a given intervention. Recognizing that particular areas of research will differ in their readiness for scaling up, IERI invites prospective grantees to submit their projects as either **Phase I** or **Phase II** projects. Phase I awards provide investigators with an opportunity to prepare for broad scale-up. Phase II awards are for projects that are fully prepared to move an intervention to scale in significant numbers of complex educational settings.

Review criteria used to judge the merit of IERI proposals are concerned with: 1) the project's focus on scaling up, 2) evidence of effectiveness prior to scaling up, 3) the methodological rigor of research designs and measurements, 4) the development of an interdisciplinary approach, and 5) the use of technology as an instructional tool and/or as an aid to scaling up. All IERI projects should demonstrate the capacity to advance our understanding of student learning and achievement in reading, mathematics, or the sciences. IERI supported projects should also work to establish scientifically based knowledge of how the strategies and practices of scaling up may be studied, understood and improved upon.

InterAgency Program Managers

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Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.076 --- Education and Human Resources

ELIGIBILITY INFORMATION

- **Organization Limit:** None
- **PI Eligibility Limit:** None
- **Limit on Number of Proposals:** A principal investigator may submit only one full proposal and he/she may collaborate in one other proposal.

AWARD INFORMATION

- **Anticipated Type of Award:** Standard or Continuing Grant, or Cooperative Agreement
- **Estimated Number of Awards:** Number will depend on mix of Phase I and Phase II awards
- **Anticipated Funding Amount:** \$48,000,000 pending availability of funds

PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

- **Letters of Intent:** Submission of Letters of Intent is optional. Please see the full program announcement/solicitation for further information.
- **Full Proposals:** Supplemental Preparation Guidelines
 - The program announcement/solicitation contains supplements to the standard Grant Proposal Guide (GPG) proposal preparation guidelines. Please see the full program announcement/solicitation for further information.

B. Budgetary Information

- **Cost Sharing Requirements:** Cost Sharing is not required.
- **Indirect Cost (F&A) Limitations:** Not Applicable.
- **Other Budgetary Limitations:** Not Applicable.

C. Deadline/Target Dates

- **Letters of Intent (*optional*):** March 15, 2002
- **Preliminary Proposals (*optional*):** None
- **Full Proposal Deadline Date(s):** May 15, 2002

D. FastLane Requirements

- **FastLane Submission:** Required
- **FastLane Contact(s):**
 - DeMonica L. Parks, Research, Evaluation, and Communication, 855, telephone: 703-292-5167, e-mail: dparks@nsf.gov.

PROPOSAL REVIEW INFORMATION

- **Merit Review Criteria:** National Science Board approved criteria. Additional merit review considerations apply. Please see the full program announcement/solicitation for further information.

AWARD ADMINISTRATION INFORMATION

- **Award Conditions:** Additional award conditions apply. Please see the program announcement/solicitation for further information.
- **Reporting Requirements:** Additional reporting requirements apply. Please see the full program announcement/solicitation for further information.

I. INTRODUCTION

The mission to improve education should be supported by vigorous and sustained research and development. State and local policy makers, as well as school-level administrators, need information on how to implement changes that lead to increased and sustained student learning. In support of this mission, the Interagency Education Research Initiative (IERI) is meant to help educators produce sustainable improvements in education for diverse student populations. IERI recognizes that the next generation of educational research must be attentive to the context in which educators do their work, pushing beyond controlled laboratory studies to ensure adaptability to classroom settings. Research of this kind seeks to balance the insights of scientific knowledge against the realities of varied educational contexts. For IERI, the achievement of such a balance results in improved learning among diverse student populations who are educated in a range of school settings.

IERI received its initial impetus from a 1997 report of the President's Committee of Advisors on Science and Technology (PCAST) in which the need for "use inspired research" (see Stokes, 1997) in education was argued (see <http://www.ostp.gov/pcast/k-12ed.html>). The PCAST report also highlighted the importance of developing technologically based solutions to educational problems. Building on the recommendations of PCAST, IERI was developed by an interagency team that includes representatives from the National Science Foundation (NSF), the Department of Education's Office of Educational Research and Improvement (OERI), and the National Institute of Child Health and Human Development (NICHD) within the National Institutes of Health. As a federally sponsored program of research that reflects the common interest of these three agencies, IERI was created to improve student learning and achievement in reading, mathematics, and the sciences. To achieve this goal, IERI will support rigorous research on the effectiveness of evidence-based educational interventions implemented in varied and complex educational contexts.

IERI operates on the assumption that decisions to implement educational interventions on a large scale should in all instances be supported by empirically validated research that has rigorously tested the broad applicability and theoretical validity of interventions and implementations. For the IERI, the term *intervention* refers to the set of coordinated instructional practices and/or curricular innovations meant to bring about specific changes in student learning and achievement. The term *implementation* refers to the steps taken and resources required to apply an intervention in multiple classrooms, schools, school districts, or states. Whereas interventions may be described in terms of cognitive or instructional concepts, implementations are ordinarily described in terms of logistical arrangements, organizational structures, policy issues, human resources, and fiscal requirements.

IERI is interested in supporting projects that study the implementation of evidence-based interventions across varied educational contexts. Studying the effect of variations in educational context provides researchers with an opportunity to assess the robustness of interventions and implementations and to test the validity of associated theories. By studying the effectiveness of both interventions and implementations, research on scaling up is meant to identify the conditions under which systematic attempts to improve student learning and achievement succeed. Applications focused less directly on student learning (e.g., teacher learning, curriculum development, instructional technology) need to demonstrate how their projects serve the goal of improving student learning and achievement in one or more of the designated content areas (i.e., reading, mathematics, or the sciences). In all cases, studies of student learning and achievement should be linked, theoretically, empirically, practically, to aspects of the intervention and the implementation posited as key predictors of success. To this end, IERI encourages investigators to combine theoretical models and methodological approaches from a variety of disciplinary perspectives to improve our understanding of problems associated with the scaling up of educational interventions.

All IERI applications should demonstrate how the intervention is based on a strong foundation of empirical evidence and describe how the intervention addresses a problem of educational significance. In order to be competitive, applications must describe and document the logistical plans, organizational linkages, and collaborative arrangements that have been put in place to implement the intervention with large numbers of students, teachers, and schools. This combination of demonstrated empirical evidence of effectiveness and documented practical preparedness for applying an intervention to significant numbers of students, teachers, and schools is the hallmark of a project that is ready for a study of scaling up.

PROGRAM PRIORITY: RESEARCH ON SCALING UP

Research on scaling up is defined as the systematic investigation of effective educational interventions as they are implemented in varied educational settings, serving large, diverse samples of students. *Systematic investigation* refers to research that is theoretically grounded and methodologically rigorous. For IERI, the notion of systematic investigation applies to the study of both the intervention and the implementation. This means that investigations into the impact of interventions and implementations should be approached as formal research activities. *Effective interventions* are those that have demonstrated the capability to improve student learning and achievement.

The IERI focus on scaling up highlights four issues of importance for applicants to consider as they develop their proposals.

1. **Implementation as Substantive Topic of Investigation** - Research on scaling up should identify and investigate problems of implementation. Variables associated with the way in which an intervention is applied across schools, schools districts, and or/states should be well integrated into research on scaling up. Factors known to affect the success of implementations (e.g., teacher development, fidelity of implementations, competing policy mandates) should therefore be investigated.
2. **Large, Diverse Study Samples as Tests of Generalizability** - Research on scaling up must involve large numbers of students. Such research must, over the course of the study, reflect the diversity (e.g., demographic, socio-economic) of student populations found in America's schools. The degree to which the implementation of interventions are effective among large, diverse student population will better support claims about the generalizability of a given intervention.
3. **Variation in Educational Context as a Test of Robustness** - Research on scaling up should produce results about the robustness of an intervention. A robust intervention is one that is capable of producing consistent results across various educational contexts. The carefully planned study of variables associated with educational context is critical to IERI. In all cases, the study of scaling up requires that the set of variables used to define variations in educational context be theoretically grounded and well documented.
4. **Empirical Evidence as a Precondition for Scaling up** - Research on scaling up is meant to investigate the broad implementation of evidence-based educational interventions. The decision to implement a particular intervention should be based on the findings from rigorous research in which improvements in student learning and achievement have been well demonstrated.

The intervention proposed for study must address an area of central and broad importance to improving student learning in reading, mathematics, and the sciences. Interventions that are defined too narrowly, or that enhance learning on very specific topics (e.g., a single unit of course content), run counter to the IERI goal of supporting research on the implementation of effective and broadly applicable interventions.

Research on scaling up should produce knowledge about the effectiveness of interventions in reading, mathematics, and the sciences, as they are applied in varied educational settings to diverse student populations. Such research should also produce knowledge about scaling up itself, both as set of procedures and as an area of inquiry. Knowledge about scaling up procedures should provide the educational community with evidence-based guidelines about how to improve implementation practices. Knowledge about scaling up, as an area of inquiry, should provide educational researchers and evaluators with insights about how to conceptualize, theorize, measure, and design studies on the large scale implementation of educational interventions.

Scaling up, as an object of inquiry, needs to be described in terms of a well articulated conceptual framework. Applicants are therefore urged to draw upon research literature that has identified key factors associated with the success of large-scale implementations. For example, the results of one recent study have suggested that teachers' attitudes and perceptions toward an intervention, school size (i.e., large or small), school level (e.g., elementary or secondary), and district encouragement and support (e.g., policies and resources) affect successful implementation and therefore should be considered in studies of scaling up (see Berends, Kirby, Naftel, and McKelvey, 2001). The importance of studying levels of consistency between professional development activities and program goals have also been cited as important for investigations of scaling up (see Fullan, 2000). The impact of incentive programs on implementation (see Cohen, 1995), and the influence of external structures (e.g., standards of teaching practice, mandated credential requirements) that support broad implementation (see Elmore, 1996) suggest other sets of variables to consider. Certain variables have been cited as important predictors of the success and long term sustainability of a given intervention (see Ramey and Ramey, 1998). In all IERI projects, factors identified as important for scaling up should be theoretically grounded and studied in methodologically rigorous ways (see Cook, Habib, Phillips, Settersen, Shagle, and Degirmencioglu, 1999).

PHASE I and PHASE II PROPOSALS: READINESS FOR SCALE

In order to be considered for IERI funding, proposals must provide evidence that supports the effectiveness of a given intervention. Proposals must also demonstrate the readiness of project staff to work productively with significant numbers of students, teachers, schools, school districts, and, in some cases, multiple states. In no instances will IERI support basic research to establish initial or preliminary evidence of effectiveness for an educational intervention. IERI will, however, consider proposals for projects that have evidence of effectiveness but lack the capacity to implement an intervention on a large scale. The distinction between Phase I and Phase II projects is that Phase II projects have amassed evidence of effectiveness in a variety of educational conditions **and** have established the capacity to implement the intervention across a large number of diverse educational settings. Further guidance for the Phase I and Phase II project proposals follows.

Phase I Projects. The purpose of Phase I projects is to support the further development of projects for which replicability of interventions and implementations and/or robustness of treatment effects across varied educational contexts has yet to be demonstrated. To support the development of research projects toward scale-up, applicants may request 1-2 years of Phase I funding for up to **\$500,000** per year. Phase I support is designed to: (1) identify, through theoretically derived and empirically testable propositions, critical variables and educational conditions that explain the replicability and/or robustness of an intervention, (2) develop and test organizational resources needed to implement an intervention across varied educational contexts with diverse student populations,

(3) conduct a limited study of scale-up to identify key implementation issues and to refine methodological features (including instrument development) of the research. Results of the combination of these activities, must demonstrate that the project has established a firm foundation on which to pursue a Phase II project. In sum, Phase I projects are provided with support to develop a theoretically based, empirically tested, interdisciplinary approach to study scale-up. Projects with Phase I awards must submit a proposal to compete for Phase II support.

Phase II Projects. The goal of Phase II projects is to take a proven intervention to scale. By sampling a variety of educational contexts, Phase II research examines the conditions under which taking the intervention to scale in multiple settings is successful. Phase II projects may receive funds for up to five years with total funding over the period not typically exceeding six million dollars. Phase II projects must be ready to be moved to scale and have: 1) developed the interdisciplinary approach and practical arrangements (e.g., logistical plan, collaborative partnerships, etc.) needed for scale-up, 2) appropriate rigorous methodological approaches, and 3) a well-described technology component (See Review Criterion V on Technology noted below).

II. PROGRAM DESCRIPTION

FOCUS AREAS

IERI has identified reading, mathematics, and the sciences as the three focus areas in which studies of scaling up may be proposed. Applicants may propose studies of scaling up in one area or in some combination of areas (e.g., reading and science for an investigation of scientific literacy, mathematics and science for an investigation of scientific problem solving skills). The following sections describe broad, educationally significant national problems in each of the disciplines. Applicants are invited to focus on such problems (or other educationally significant problems in reading, mathematics, and the sciences) to propose studies that identify the conditions under which efforts to improve student learning may succeed in complex and varied school settings.

READING

Scaling up research on reading should identify the instructional conditions necessary to ensure children's development of **all** critical skills, concepts and strategies requisite to reading success. Substantial converging evidence has accrued over the past two decades that underscores the importance of several factors that must be integrated to ensure robust reading development. These factors include, but are not limited to, motivation to read, phonemic awareness, word level reading skills, vocabulary development, automaticity and fluency, and the development of comprehension strategies. However, it remains unclear how to best foster and integrate these attributes and abilities in complex "real-world" instructional settings with students who vary in cognitive, linguistic, behavioral/motivational, and academic development. While scientific progress has been made in identifying crucial instructional conditions and strategies for teaching phonemic awareness and word reading skills in complex classroom settings, evidence relevant to the instruction, development and integration of motivation to read, reading fluency, vocabulary and reading comprehension strategies along with word reading skills is only now emerging at both basic and applied levels (see the Report of National Reading Panel, 2000). The need to test, in actual school settings, the validity of newly discovered knowledge of important aspects of reading is a priority for reading research.

MATHEMATICS

Many studies show that US students struggle to achieve in mathematics. The Third International Mathematics and Science Study (TIMSS), and the TIMSS-Repeat Study (<http://nces.ed.gov/timss/>) reveal that students in the United States master fundamental skills and knowledge of mathematics during their elementary school years at the same rate as their international peers on average. These studies, however, indicate that U.S. students are less likely to master and/or be taught more complex and conceptually difficult material during their middle and high school years, resulting in lower achievement, relative to students from other countries. Furthermore, various studies indicate that teachers themselves frequently lack the thorough understanding of the fundamental concepts that are necessary to enable them to apply or design effective instructional strategies.

The National Academy of Sciences (NAS) recently published *Adding it Up: Helping Children Learn Mathematics* (2001). The NAS report argues for a comprehensive view of mathematics learning that the committee refers to as "mathematical proficiency." Mathematical proficiency has five strands: conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition. The report synthesizes the research base and highlights a number of issues that are relevant to the IERI goal to improve learning achievement in mathematics. Among the significant issues for IERI are the following: 1) early mathematics learning and the achievement gap needs more focused research attention, 2) algebra instruction needs to be improved incorporating what is known from research, and 3) a focus on professional development that incorporates a more comprehensive approach to working with mathematics teachers is needed. Research on scaling up is needed in these areas of mathematics education and in other areas pertinent for improving student learning in kindergarten through twelfth grade.

SCIENCES

There is a critical need to improve science instruction, as the most recent results from the National Assessment of Educational Progress (NAEP) attest. The findings from NAEP show that, overall, student achievement is not improving in the sciences. At the 12th grade level, student achievement has actually declined when compared with students' scores five years ago (National Center for Educational Statistics, 2000). Further, the Third International Mathematics and Science Study - Benchmark Study - indicates that there are great inequities in science achievement across the country. The results demonstrate that students in some schools perform among the best in the world, while students in other schools do poorly (Martin et al., 2001; National Center for Educational Statistics, 1999). IERI projects can help address these serious concerns by scaling up the most powerful and promising approaches to science education—approaches whose effectiveness is attested by the accumulated evidence from research.

Several promising lines of research in science learning and teaching are candidates for scaling up as IERI projects. If scaled successfully, these projects will help meet the need to improve science achievement overall, as well as address inequities among science learners in achievement outcomes. Among the most promising lines of research, one major development is the recognition of scientific inquiry as a broad way to characterize how scientific research is carried out, and how learners come to understand science and the nature of the scientific enterprise. Another fruitful but underutilized line of research is the discovery that, in the process of trying to understand the natural world, students often develop deeply-held misconceptions. Because science misconceptions are often robust, one problem faced by science teachers is how to challenge, change, or build upon the beliefs that students bring to the classroom.

Another important line of research concerns the preparation of science teachers; most teachers in elementary and middle schools do not have a strong background in the sciences, and this weak preparation places limits on their ability to teach the subjects effectively. One way to improve achievement in science would be to scale up approaches to professional development that help teachers understand the relevant scientific content, as well as pedagogical approaches that deepen student understanding. Yet another promising research thread involves contrasting instruction that thematically integrates the sciences versus instruction that maintains the sciences as separate content areas. These and other important approaches to understanding and improving science achievement are worthy candidates for larger-scale interventions as part of the IERI initiative to improve learning outcomes in science.

III. ELIGIBILITY INFORMATION

The categories of proposers identified in the [Grant Proposal Guide](#) are eligible to submit proposals under this program announcement/solicitation.

IV. AWARD INFORMATION

Under this Program Solicitation, the three partner agencies solicit proposals for Phase I and Phase II research grants. Funding for Phase I will be for a maximum of **\$500,000** for up to 24 months; funding for Phase II grants will typically be for up to \$6 million for the life of the award (up to 60 months). Pending the availability of funds for FY 2002, the total funds available under this Initiative - to fund successful proposals across two competition cycles (one under 01-92 and the other under this solicitation) - will be up to \$48 million: \$25 million from NSF, \$20 million from OERI, and \$3 million from NICHD. Awards will be made through one or more of the participating agencies. Grantees must be willing to accept the award conditions. In particular, the human subjects certifications must conform to the NSF's requirements. Research study grants will be made for projects that address one of the focus areas and meet all the review criteria outlined in Section IV of this Program Solicitation.

Additionally, PIs may submit collaborative proposals (see the NSF Grant Proposal Guide, NSF 02-2 Chapter II Section C.3 Group Proposals, and Chapter II Section C.11.b Collaborative Proposals) for research involving collaborations between institutions. Standard or continuing grant, or cooperative agreement award mechanisms may be utilized under this Program Solicitation.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Letters of Intent:

Prospective applicants may submit an optional Letter of Intent (LOI). The LOI should be submitted by e-mail by **March 15, 2002** to ieri@nsf.gov. The letter must not exceed a single page and must provide 1) Project title, 2) names and institutional affiliations of the Principals Investigators, and Co-Principal Investigators, 3) Selection of Phase I or Phase II application (non-binding), 4) Planned duration of the project and budget request. Proposers are reminded to identify the program solicitation number (NSF-02-062) in the program solicitation/solicitation block on the proposal Cover Sheet (NSF Form 1207). Compliance with this requirement is critical to determining the relevant proposal processing guidelines.

Full Proposal:

Proposals submitted in response to this program announcement/solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF *Grant Proposal Guide* (GPG). The complete text of the GPG is available electronically on the NSF Web Site at: <http://www.nsf.gov/cgi-bin/getpub?gpg>. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (301) 947-2722 or by e-mail from pubs@nsf.gov.

Two meetings, located in different regions of the United States, will be held to discuss the application process and to answer questions that researchers may have as they develop their proposals. For dates, times, and locations of these two meetings please refer to <http://www.ed.gov/offices/OERI/ieri.html> ; or contact one of the agency representatives listed in this announcement.

Proposers are reminded to identify the program solicitation number (NSF-02-062) in the program announcement/solicitation block on the proposal Cover Sheet. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

B. Budgetary Information

Cost sharing is not required in proposals submitted under this Program Solicitation.

C. Deadline/Target Dates

Proposals must be submitted by the following date(s):

Letters of Intent (optional): March 15, 2002

Full Proposals by 5:00 PM local time: May 15, 2002

D. FastLane Requirements

Proposers are required to prepare and submit all proposals for this Program Solicitation through the FastLane system. Detailed instructions for proposal preparation and submission via FastLane are available at: <http://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call 1-800-673-6188 or e-mail fastlane@nsf.gov.

Submission of Electronically Signed Cover Sheets. The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see [Chapter II, Section C](#) of the Grant Proposal Guide for a listing of the certifications). The AOR must provide the required certifications within five working days following the electronic submission of the proposal.

Further instructions regarding this process are available on the FastLane website at:

<http://www.fastlane.nsf.gov>.

VI. PROPOSAL REVIEW INFORMATION

A. NSF Proposal Review Process

Reviews of proposals submitted to NSF are solicited from peers with expertise in the substantive area of the proposed research or education project. These reviewers are selected by Program Officers charged with the oversight of the review process. NSF invites the proposer to suggest, at the time of submission, the names of appropriate or inappropriate reviewers. Care is taken to ensure that reviewers have no conflicts with the proposer. Special efforts are made to recruit reviewers from non-academic institutions, minority-serving institutions, or adjacent disciplines to that principally addressed in the proposal.

The two merit review criteria are listed below. The criteria include considerations that help define them. These considerations are suggestions and not all will apply to any given proposal. While proposers must address both merit review criteria, reviewers will be asked to address only those considerations that are relevant to the proposal being considered and for which he/she is qualified to make judgements.

What is the intellectual merit of the proposed activity?

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of the prior work.) To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

What are the broader impacts of the proposed activity?

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

NSF staff will give careful consideration to the following in making funding decisions:

Integration of Research and Education

One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learning perspectives.

Integrating Diversity into NSF Programs, Projects, and Activities

Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

Additional Review Criteria

Each IERI application will be reviewed according to two sets of review criteria. A first set of more general NSF review criteria are of broad relevance to the review process. A second set of criteria focuses reviewers' attention on issues of specific importance to the programmatic objectives of IERI.

IERI SPECIFIC REVIEW CRITERIA

Each application will be judged according to five IERI specific review criteria.

Criterion I: Focus Scaling up

Following the description of research on scaling up presented earlier (see section II), applications submitted to IERI should demonstrate the way in which investigators have attended to three issues in the development of their proposals (note: a fourth issue – empirical evidence – is addressed separately in Criterion II):

1. **Implementation as a Substantive Topic of Investigation** - To what extent does the application specify implementation as a topic of investigation? Is the notion of educational context approached as a theoretically grounded concept that can be used to study the conditions under which educational interventions succeed? Are key variables related to the success of implementations (e.g., teacher development, fidelity of implementation, competing policy mandates) identified and included in the study?
2. **Large, Diverse Study Samples as Tests of Generalizability** - To what extent will the proposed study involve large numbers of diverse student populations (e.g., ability level, race/ethnicity) to test the generalizability of the intervention?
3. **Variation in Educational Context as a Test of Robustness** – To what extent will the proposed study examine variations in educational context as a way to test the robustness of an intervention?

Research on scaling must study the implementation of educationally significant interventions. The intervention proposed for study must address an area of central importance and broad relevance to improving student learning in reading, mathematics, and the sciences. Interventions that are defined too narrowly, or that enhance learning on very specific topics, run counter to the IERI goal of supporting research on effective and broadly applicable interventions.

Criterion II: Empirical Evidence for Scaling up

An intervention identified for scaling up should have an associated foundation of empirical evidence upon which plausible cause and effect assertions (between interventions and student learning and achievement) may be based. Applicants may provide an argument that such a foundation exists by: 1) presenting results from randomized studies – experimental or quasi-experimental, 2) demonstrating evidence of convergent research findings gathered from a methodologically rigorous, substantively coherent body of research directly related to the types of questions cited in the proposed study, 3) describing results from meta-analytic studies in which the impact of an educational innovation has been measured by effect size. Expert opinions, anecdotal reports, limited case studies, or other descriptive studies (e.g., surveys, qualitative or ethnographic studies) will not be accepted as stand-alone sources of evidence in support of immediate scale-up. When observational, survey, or qualitative evidence is provided as support for the effectiveness of a particular intervention that is being considered as a candidate for scaling up, such evidence should be accompanied by quantitative data derived from randomized experiments or well-controlled quasi-experiments. In such instances, it will be useful for applicants to establish criteria for evaluating the trustworthiness and credibility of qualitative evidence, the transferability of the evidence, and the adequacy of the qualitative evidence in combination with quantitative data for testing hypotheses relevant to the effectiveness of a model, program, and/or strategy.

Criterion III: Research Methodology

IERI proposals must study student learning and achievement, and scaling up by employing research and measurement designs that are demonstrably valid and reliable. Experimental studies, with random assignment, and quasi-experimental designs are encouraged when appropriate. Randomized experiments or well-controlled quasi-experiments combined as appropriate with detailed observational, micro-genetic, survey and qualitative methodologies are encouraged.

Qualitative methodologies are encouraged as a complement to quantitative methodologies to assist in the identification of actors that explain the effectiveness or ineffectiveness of models, programs, and/or strategies. Proposals should provide research designs to identify and assess the impact of factors that affect the fidelity of implementation during scale-up. A report recently issued by the National Academy of Sciences, titled "Scientific Inquiry in Education," provides general guidance about the nature of methodologically rigorous research (see <http://www.nap.edu/catalog/10236.html>).

Specific details that applicants should address under the research methodology review criterion include the following:

- 1) Research Design-** the applicant must provide a detailed research design and describe how potential threats to internal and external validity will be addressed.
- 2) Sampling-** the applicant must define, as completely as possible, the sample to be selected and sampling procedures to be employed for the proposed study. Additionally, the applicant should show how the long-term participation of those sampled will be assured.
- 3) Data Collection Tools-** the applicant must supply information on the reliability, validity, and appropriateness of proposed measures. If the reliability and validity of the measurement, assessment, or observational procedures are initially unknown, the applicant must include specific plans for establishing these measurement properties.
- 4) Interventions/Implementations -** the applicant must specify how the implementation of the intervention will be documented and measured. The proposal should either indicate how the intervention will be maintained consistently across multiple classrooms and schools over time or describe the parameters under which variations in the intervention may be described. In all instances, investigators should attempt to ground their analyses of interventions/implementations in relevant theoretical frameworks.
- 5) Data Analysis-** All proposals should provide detailed descriptions of data analysis procedures. For quantitative data, specific statistical procedures should be cited. For qualitative data, specific methods used to index, summarize, and interpret data should be delineated.

As noted above, assignment to treatment conditions should be randomized where possible. Consequently, the study population needs to be carefully defined and the method of randomization (including both selection and assignment) needs to be made explicit. For example, the randomization might be simple or stratified; the motivation for using selected strata should be grounded in a theoretical framework that defines the research questions. Moreover, over-sampling may be needed as a strategy to compensate for sample loss.

Criterion IV: Interdisciplinary Approach

An interdisciplinary approach is reflected most clearly in the types of research questions, the nature of theoretical propositions, the development of research designs—including measurement tools, and the methods of data analysis models used to investigate the effectiveness of implementations. Although it will be important to identify research staff who have the collective capacity to address the full range of problems associated with scaling up, the interdisciplinary criterion requires the presentation of a well articulated set of connections between the nature of a given research problem and the different disciplinary perspectives used to approach that problem.

Given the complexity of the subject matter and the school settings in which educational research and practice take place, interdisciplinary research teams will be necessary to bring a wide variety of relevant knowledge and methodologies to bear on the problems associated with the scale-up of evidence-based educational interventions. Collaborations across disciplines (e.g., information technologists, political scientists, economists, organizational theorists, psychometricians, mathematicians, statisticians, educational researchers, cognitive scientists, developmental psychologists, and practitioners) are required. It is particularly important to describe how theories obtained from different disciplinary perspectives will inform, and explain the effects of, the attempt to scale-up evidence-based interventions. Perspectives that are likely to be important for IERI's focus on scale-up include, but are not limited to 1) student and teacher cognition—including knowledge from cognitive science, 2) child development and teacher development, 3) school reform processes, 4) economics of implementations, 5) policy development and implementation, and 6) community and sub-cultural factors that affect instructional outcomes.

It is important to point out that interdisciplinary collaboration is not simply the incorporation of multiple disciplines and methods to address the research questions that are being posed. Rather, interdisciplinary collaborations proposed within projects must demonstrate how such collaborations will achieve synergy among disciplines that reflects the whole being greater than the sum of its parts. IERI project research should therefore produce well-integrated, discipline-based knowledge about successful interventions and implementations.

Criterion V: Technology

Technology has great potential as a critical support for scaling up. Technology encompasses a variety of electronic tools, media, and environments that can be used to enhance student learning, foster creativity, stimulate communication and collaboration among teachers and students, and engage in the continuous development and application of knowledge and skills. Technology may be proposed as a tool, device or environment for implementing and/or evaluating specific learning/instructional approaches and strategies. It may be used for enhancing the effects and efficiency of already proven methods or strategies in traditional settings or to develop new educational methods or strategies. Technology also may be used as a management tool in implementing proposed studies. Proposals that concentrate solely on using technology without addressing educational issues and questions relevant to the basic requirements of this Initiative will not be funded.

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the identities of reviewers, are sent to the Principal Investigator/Project Director by the Program Director. In addition, the proposer will receive an explanation of the decision to award or decline funding.

B. Review Protocol and Associated Customer Service Standard

All proposals are carefully reviewed by at least three other persons outside NSF who are experts in the particular field represented by the proposal. Proposals submitted in response to this announcement/solicitation will be reviewed by Mail and/or Panel Review.

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

NSF is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. The time interval begins on the closing date of an announcement/solicitation or the date of proposal receipt (whichever is later). The interval ends when the Division Director accepts the Program Officer's recommendation.

In all cases, after programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications and the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at one's own risk.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program Division administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See section VI.A. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (NSF-GC-1)* or Federal Demonstration Partnership (FDP) Terms and Conditions;* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreement awards also are administered in accordance with NSF Cooperative Agreement Terms and Conditions (CA-1). Electronic mail notification is the preferred way to transmit NSF awards to organizations that have electronic mail capabilities and have requested such notification from the Division of Grants and Agreements.

*These documents may be accessed electronically on NSF's Web site at http://www.nsf.gov/home/grants/grants_gac.htm. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, available electronically on the NSF Web site at <http://www.nsf.gov/cgi-bin/getpub?gpm>. The GPM is also for sale through the Superintendent of Documents, Government Printing Office (GPO), Washington, DC 20402. The telephone number at GPO for subscription information is (202) 512-1800. The GPM may be ordered through the GPO Web site at <http://www.gpo.gov>.

Special Award Conditions

Awards may be made through NSF, OERI, NICHD, or through combined funding from more than one of participating agencies.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the PI must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period.

Grantees will be required to participate in semiannual PI meetings. Proposal budgets should reflect travel costs for two or three participants to travel to Washington, DC for two meetings a year.

D. Other Requirements

Because IERI is a long-term initiative oriented toward specific educational issues, the coordination of research projects is particularly important. Principal Investigators will be required to meet at least twice each year with agency staff and consultants to review results within their areas, discuss methodologies, and identify promising avenues for future research efforts.

Within 90 days after the expiration of an award, the PI also is required to submit a final project report. Approximately 30 days before expiration, NSF will send a notice to remind the PI of the requirement to file the final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

NSF has implemented an electronic project reporting system, available through FastLane. This system permits electronic submission and updating of project reports, including information on project participants (individual and organizational), activities and findings, publications, and other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system.

VIII. CONTACTS FOR ADDITIONAL INFORMATION

General inquiries regarding Interagency Education Research Initiative -- (FY2002) should be made to:

InterAgency Program Managers

- Mark A. Conostas, Office of Educational Research and Improvement, U.S. Department of Education, telephone: 202-219-1373, e-mail: Mark.Conostas@ed.gov.
- G. Reid Lyon, Section Chief, National Institute of Child Health and Human Development, 4B05, telephone: 301-496-9849, e-mail: r160a@nih.gov.
- Michael E. Martinez, Research, Evaluation, and Communication, 855, telephone: 703-292-4614, e-mail: mmartine@nsf.gov.

NSF Program Staff

- Finbarr (Barry) Sloane, Program Director, Research, Evaluation, and Communication, 855, telephone: 703-292-5146, e-mail: fsloane@nsf.gov.
- John Cherniavsky, Senior EHR Advisor for Research, Research, Evaluation, and Communication, 855, telephone: 703-292-8650, e-mail: jchernia@nsf.gov.
- Janice Earle, Program Director, Elementary, Secondary, and Informal Education, 885, telephone: 703-292-5097, e-mail: jearle@nsf.gov.
- Rodney Cocking, Program Director, Behavioral and Cognitive Sciences, 995, telephone: 703-292-8732, e-mail: rcocking@nsf.gov.

OERI Program Staff

- Harold Himmelfarb, Acting Director, National Institute of Student Achievement, Curriculum, and Assessment, Office of Educational Research and Improvement, U.S. Department of Education, tel: Harold.Himmelfarb@ed.gov
- Joe Teresa, Senior Research Analyst, National Institute on Postsecondary Education Libraries, and Lifelong Learning, Room 620, tel: 202-219-2046, Joe.Teresa@ed.gov
- Ann Sweet, Senior Research Analyst, National Institute on Student Achievement, Curriculum and Development, Room 608H, tel: 202-208-3951, Ann.Sweet@ed.gov
- Stephanie Dalton-Stoll, Senior Program Specialist, Office of Reform Assistance and Dissemination, Room 506D, tel: 202-208-2497, Stephanie.Dalton@ed.gov
- OK-Choon Park, Senior Research Analyst, National Institute on the Education of At-risk Students, Room 620, tel: 202-208-3951, OK-Choon.Park@ed.gov

NICHD Program Staff

- Peggy McCardle, Ph.D. Associate Chief, Child Development & Behavior Branch, National Institute of Child Health & Human Development, National Institutes of Health, 6100 Executive Boulevard, Room 4B05 - MSC 7510, tel: (301) 435-6863, email: pm43q@nih.gov

Other NSF Contacts

- Steve Breckler, Program Director, Behavioral and Cognitive Sciences, 995, telephone: 703-292-8728, e-mail: sbreckle@nsf.gov.
- Paul Werbos, Program Director, Electrical and Communications Systems, 668, telephone: 703-292-8339, e-mail: pwerbos@nsf.gov.
- Anthony Maddox, Program Director, Experimental and Integrative Activities, 1160, telephone: 703-292-8980, e-mail: amaddox@nsf.gov.
- Henry Blount, Head, Office of Multidisciplinary Activities, 1005, telephone: 703-292-8803, e-mail: hblount@nsf.gov.
- Carol J. van Hartesveldt, Program Director, Integrative Biology and Neuroscience, 685, telephone: 703-292-8423, e-mail: cvanhart@nsf.gov.

For questions related to the use of FastLane, contact:

- DeMonica L. Parks, Research, Evaluation, and Communication, 855, telephone: 703-292-5167, e-mail: dparks@nsf.gov.

IX. OTHER PROGRAMS OF INTEREST

The NSF *Guide to Programs* is a compilation of funding for research and education in science, mathematics, and engineering. The NSF *Guide to Programs* is available electronically at <http://www.nsf.gov/cgi-bin/getpub?gp>. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are provided in each chapter.

Many NSF programs offer announcements or solicitations concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices. Any changes in NSF's fiscal year programs occurring after press time for the *Guide to Programs* will be announced in the NSF [E-Bulletin](http://www.nsf.gov/home/ebulletin), which is updated daily on the NSF web site at <http://www.nsf.gov/home/ebulletin>, and in individual program announcements/solicitations. Subscribers can also sign up for NSF's [Custom News Service](http://www.nsf.gov/home/cns/start.htm) (<http://www.nsf.gov/home/cns/start.htm>) to be notified of new funding opportunities that become available.

The following programs may be of interest to potential IERI proposers. Information on NSF guidelines can be obtained from <http://www.nsf.gov>.

- Elementary, Secondary, and Informal Education (ESIE), NSF 01-060
- Centers for Learning and Teaching (CLT), NSF 02-038.
- National STEM Education Digital Library Program (NSDL), NSF 02-054.
- Research on Learning and Education (ROLE), NSF 02-023.
- Information Technology Research, NSF 01-149.
- Development and Learning Science Program (DLS), NSF 02-008

Department of Education programs particularly

- Field-Initiated Studies (FIS) Education Research Grant Program, Department of Education, <http://www.ed.gov/offices/OERI/funding.html>.

National Institutes of Health programs at NICHD

National Institutes of Health Extramural Funding, <http://www.nichd.nih.gov/funding/funding-opps.htm>.

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ABOUT THE OFFICE OF EDUCATIONAL RESEARCH AND IMPROVEMENT

The U.S. Department of Education's mission is to:

- Strengthen the Federal commitment to assuring access to equal educational opportunity for every individual;
- Supplement and complement the efforts of states, the local school systems and other instrumentalities of the states, the private sector, public and private nonprofit educational research institutions, community-based organizations, parents, and students to improve the quality of education;
- Encourage the increased involvement in the quality and usefulness of education through Federally supported research, evaluation, and sharing of information;
- Improve the coordination of Federal education programs;
- Improve the management of Federal education activities; and
- Increase the accountability of Federal education programs to the President, the Congress, and the public.

Additional information can be found on the Department web site: <http://www.ed.gov>

Within the Department of Education, the Office of Educational Research and Improvement (OERI) provides national leadership for educational research and statistics. OERI strives to promote excellence and equity in American education by:

- Conducting research and demonstration projects funded through grants to help improve education;
- Collecting statistics on the status and progress of schools and education throughout the nation; and
- Distributing information and providing technical assistance to those working to improve education.

Additional information can be found on OERI's web site: <http://www.ed.gov/offices/OERI/>

ABOUT THE NATIONAL INSTITUTE OF CHILD HEALTH AND HUMAN DEVELOPMENT

The National Institute of Child Health and Human Development (NICHD) seeks to assure that every individual is born healthy, is born wanted, and has the opportunity to fulfill his or her potential for a healthy and productive life unhampered by disease or disability. In pursuit of this mission, the NICHD conducts and supports laboratory, clinical, and epidemiological research on the reproductive, neurobiologic, developmental, and behavioral processes that determine and maintain the health of children, adults, families, and populations.

The NICHD Administers a multidisciplinary program of research, research training, and public information, nationally and within its own facilities, on reproductive biology and population issues; on prenatal development as well as maternal, child and family health; and on medical rehabilitation. Institute Programs are based on the concepts that adult health and well-being are determined in large part by episodes early in life, that human development is continuous throughout life, and that the reproductive processes and the management of fertility are of major concern, not only to the individual, but to society.

NICHD research is also directed toward restoring or maximizing individual potential and functional capacity when disease, injury, or a chronic disorder intervenes in the developmental process.

The Institute supports and conducts basic, clinical, and epidemiological research in the reproductive sciences to develop knowledge enabling men and women to regulate their fertility in ways that are safe, effective and acceptable to various population groups, and to overcome problems of infertility.

The purposes of Institute sponsored behavioral and social sciences research in the population field are to understand the causes and consequences of reproductive behavior and population change. Research for mothers, children, and families is designed to advance knowledge of pregnancy, fetal development, and birth; to develop strategies to prevent infant and child mortality; to identify and promote the prerequisites of optimal physical, mental, and behavioral growth and development through infancy, childhood, and adolescence; and to contribute to the prevention and amelioration of mental retardation and developmental disabilities. Much of this research focuses on the disciplines of cellular, molecular, and developmental biology to elucidate the mechanisms and interactions that guide a single fertilized egg cell through its development into a multicellular, highly organized adult organism. Research in medical rehabilitation is designed to develop improved techniques and technologies with respect to the rehabilitation of individuals with physical disabilities resulting from diseases, disorders, injuries, or birth defects.

Research training is an area supported across all NICHD research programs, with the intent of adding to the cadre of trained professionals available to conduct research in areas of critical public health concern. An overarching responsibility of the NICHD is to disseminate information emanating from the Institute research programs to researchers, practitioners and other health professionals, and to the general public.

Additional information can be obtained at <http://www.nichd.nih.gov/>.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) funds research and education in most fields of science and engineering. Awardees are wholly responsible for conducting their project activities and preparing the results for publication. Thus, the Foundation does not assume responsibility for such findings or their interpretation.

NSF welcomes proposals from all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities and persons with disabilities to compete fully in its programs. In accordance with Federal statutes, regulations and NSF policies, no person on grounds of race, color, age, sex, national origin or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NSF (unless otherwise specified in the eligibility requirements for a particular program).

Facilitation Awards for Scientists and Engineers with Disabilities (FASSED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF-supported projects. See the program announcement/solicitation for further information.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 or (800) 281-8749, FIRS at 1-800-877-8339.

The National Science Foundation is committed to making all of the information we publish easy to understand. If you have a suggestion about how to improve the clarity of this document or other NSF-published materials, please contact us at plainlanguage@nsf.gov.

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to applicant institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies needing information as part of the review process or in order to coordinate programs; and to another Federal agency, court or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records," 63 Federal Register 268 (January 5, 1998). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

Pursuant to 5 CFR 1320.5(b), an agency may not conduct or sponsor, and a person is not required to respond to an information collection unless it displays a valid OMB control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to: Suzanne Plimpton, Reports Clearance Officer, Division of Administrative Services, National Science Foundation, Arlington, VA 22230, or to Office of Information and Regulatory Affairs of OMB, Attention: Desk Officer for National Science Foundation (3145-0058), 725 17th Street, N.W. Room 10235, Washington, D.C. 20503.

OMB control number: 3145-0058.